In the year 1856 much excitement was produced among the naturalists of Vienna by the meeting of German naturalists and physicians in that city, and a great impulse was given to Natural History studies by the voyage of circumnavigation performed in the years 1857-1859 by the frigate *Novara*, under the auspices of the Archduke Ferdinand Max, afterwards, to his misfortune, Emperor of Mexico. During this period also there was a movement in favour of publicity in the medical and philosophical faculties of the University, and some series of public lectures were delivered.

1860. On the 6th December the Society for the Diffusion of Physical Knowledge commenced its proceedings in the apartments of the Imperial Academy of Sciences. The first general meeting took place on the 13th May, 1861, in the hall of the Musical Society, when Prof. Eduard Suess delivered a foundation address. The proceedings and lectures may properly be carried back through the agency of Dr. J. Grailich and his associates to the year 1855, when they commenced in the meeting-room of the Imperial Geological Institute. This society has continued to give lectures on Natural Science in two places, in one of which the old forms of a society are retained, whilst in the other lectures find interested listeners.

1861. The Photographic Society, independently formed, held its first meeting under the presidency of Prof. A. Schrötter in the green saloon of the Imperial Academy of Sciences on the 22nd March. The first photographic Exhibition in Vienna was opened on the 17th May, 1864.

1862. The Austrian Alpine Club was established, its first constituent general meeting being held on the 19th November.

1864. The Lower-Austrian Society for "Landeskunde held its first constituent meeting on the 16th December.

1865. The Austrian Meteorological Society was founded on the 16th November, with an address from Dr. Karl Jelinek.

1866. The year of the war. Prof. Haidinger retired in consequence of ill health from the direction of the Imperial Geological Institute, and was succeeded by Franz von Hauer.

1869. A section of the German Alpine Association held its meeting in Vienna.

1870. The Chemico-physical Society established under the presidency of Prof. H. Hlasiwetz.

1870. The Anthropological Society founded on the 13th February. Its opening meeting was held in the Consistorial Hall of the University, when the president, Prof. Karl Rokitansky, delivered an address.

1870. The Numismatic Society established.

It is with a considerable pride that the venerable Prof. Haidinger describes the rapid advance that has been made in the scientific progress of his native city, and dwells upon the fact that the first impulse to this movement was given by the association of the "Friends of the Natural Sciences," in which he took so much interest. The cause of the failure to form a well-established society from such a promising commencement he finds in the unfavourable conditions of the time; and doubtless the spasmodic political movements which so closely followed the year 1845 may well have distracted the attention of German men of science. The nascent society seems, however, to have merged into the Imperial Geological Institute, which has already done so much good work, and Prof. Haidinger is probably in the right when he claims for the "Friends of the Natural Sciences" in their new capacity a vigorous influence in the establishment of other scientific societies both in and out of Vienna.

The 8th November, 1845, may therefore well be "a day of joyful commemoration" with Austrian scientific men, for although, as Prof. Haidinger remarks, any retrospect reaching so far back must bring with it serious thoughts of the many participators in the first labours of the period who have disappeared from the scene, there is yet a higher point of view of a satisfactory nature, namely, that this period of twenty-five years has raised Austria to a far higher scientific position among nations than could have been claimed for her before, and, as he says, "Peaceful progress is certainly the highest and worthiest object of human endeavours."

LAUGHTON'S PHYSICAL GEOGRAPHY

Physical Geography in its Relation to the Prevailing Winds and Currents. By John Knox Laughton, M.A., F.R.G.S., &c. (London: J. D. Potter, 1870.)

THIS work is designed to show that the whole atmosphere, relatively to the surface of the earth, continually moves or tends to move from west to east, and that the permanent local variations from this direction are either eddies or deflections, formed in accordance with the principles which regulate the motion of fluids (p. 312). In the course of the discussion, Mr. Laughton has done good service by showing that prevailing opinions respecting the circulation of the atmosphere are very far from being in accordance with many well-ascertained facts; and by insisting on the dependence of oceanic on atmospheric currents, which is confirmed in every case where the facts are tolerably well known. The book also contains the best popular account we have of the prevailing winds over large portions of the ocean. But he is not so happy with respect to prevailing winds over the land, and in the reasoning he employs in proof of a general motion of the atmosphere from west to east.

It is stated that from Japan northwards the prevailing winds in summer are westerly (p. 136); and to the influence of these winds, blowing across the northern opening of the narrow seas of this part of the earth, are ascribed the southerly winds on the coast of China, and thence southward to the equator (p. 280). Now the prevailing winds of this region are not westerly in summer, the direction being E.S.E. at Tong-chow, S.S.E. at Pekin and New-Chwang, S.S.W. at Nangasaki, S.E. by S. at Chacodate, E. at Nicolajewsk near the mouth of the Amoor, and N.E. at Ajansk, S.W. also prevailing to some extent at the last place.

We are told that the wind blows almost constantly from the west on the north-west coasts of the Old and New Worlds respectively (p. 154). Now, whilst in winter the prevailing wind in Vancouver Island is S.W., at Sitka it is E.S.E., easterly winds being to westerly as 4 to 1, and E.N.E. at Ikogmut. Again, over the whole of the west of Norway, the prevailing winds in winter are either S. or S.S.E. or S.E.; at Christiania they are N.E., easterly

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winds being to westerly as 8 to 3—a relation which could not hold if prevailing winds in this region were westerly. At Copenhagen the direction is S.S.W. In accordance with these facts the rainfall of the west of Scotland is much greater than that of the west of Norway.

Mr. Laughton maintains that there is, throughout the sea, no trace whatever of the air being drawn in to any place of greatest heat, &c. (p. 303), and adduces many instances in support of this opinion; but, curiously enough, every case adduced confirms the opposite view. This arises from a misapprehension of the principle involved in Buys Ballot's Law of the Winds, which may be thus put: Winds flow in towards the space where pressure is weak, vorticosely, so that in the N. hemisphere, standing back to the wind, the weak pressure is to the left. To take one case as an illustration:—Because the winds at Aden and south of Arabia do not blow directly in upon the heated sands of that region, but blow from W.S.W., it is concluded that there is no trace whatever in this part of the sea of the heated air influencing the winds. Now, if it be the case that there is at this season a weakening of the pressure by an ascending current of heated air from the surface of Arabia, then, according to Buys Ballot's law, the direction of the wind ought to be what observation shows it is, viz. W.S.W., and the more powerful the ascending current, the stronger will be the W.S.W. winds on the surface.

Mr. Laughton regards it as established presumptively that a westerly upper current everywhere prevails (p. 97). This he has shown generally to be the case as respects upper currents of tropical regions and a portion of the United States, but not as respects other parts of the globe. The explanation of these upper currents is easy. If the pressure of the atmosphere, at a uniform height of say, 10,000 feet, were ascertained, the highest would be immediately over the belt of calms, and the lowest over those regions where the mean temperature of the whole stratum, 10,000 feet thick, happens to be the lowest; this result being a simple consequence of the increased tension of air by heat, and diminished tension by cold. Since the pressure at the height supposed will continually diminish on receding from the Equator on either hand, it follows from Buys Ballot's Law that the prevailing upper currents ought to be westerly within the tropics, or, stated more exactly, W. by S. north of the Equator, and W. by N. south of it. It is during the winter months that westerly upper currents prevail in the United States. Since during this season the mean temperature rapidly sinks in advancing northwards over America, atmospheric pressure will be much weaker over British America at a height of 10,000 feet than over the United States, and hence by Buys Ballot's Law the upper current of the United States ought to be westerly. It may be remarked that since westerly upper currents are flowing towards colder regions, condensation of their vapour into cloud must frequently take place, thus rendering them visible; whereas since easterly currents flow towards warmer regions, condensation will seldom take place, and hence they must frequently flow past unobserved.

The broad zone included between latitudes 30° N. and S. comprises half the superfices of the globe. Over by far the greater portion of this zone winds are easterly, there being no season when any approach to a preponderance of westerly winds is apparent. When to these are added the easterly winds in extra-tropical regions, already referred to, a predominance of easterly winds in the north of Siberia and in the east of Australia, in their respective summers, and in a large part of the Arctic regions at all seasons; and though not a predominance yet the frequent occurrence, of easterly winds in the S. hemisphere, south of latitude 50°, it is plain that if there can be a preponderance of westerly winds over the globe viewed as a whole, it cannot be very great. A. B.

THE SEWAGE QUESTION

The Practical Solution of the Great Sewage Question, by a Combination of the Irrigation and Precipitating Processes. By William Justyne. (John B. Day.)

IN this little book the author tries to show that the A B C process is the only one which promises any hope of success among the methods which have been proposed or adopted for purifying sewage and utilising its valuable manurial constituents. "Miscellaneous schemes," including the dry-earth system, Liernur's process, and all the precipitation plans, except the favoured one, are dismissed very summarily, and the irrigation system is made to look as unsuccessful and as dangerous as its opponents have ever represented it to be, while the immense weight of indubitable facts and evidence on the other side is entirely passed over.

Then the A B C process is minutely described, and the scientific public is asked to believe that sewage, which contains suspended and dissolved organic and inorganic matters, and the chief value of which consists in the large amount of dissolved nitrogen, especially in *the form of ammonia*, which it contains, can be so purified by precipitation with a mixture of alum, blood, clay, animal charcoal, and what not, as that the effluent water shall contain no putrescible matter, and that the *precipitate* shall contain the manurial constituents!

What we do know with regard to the A B C and all other precipitating processes is, that they none of them separate out anything like all the dissolved (few of them nearly all the suspended) organic matters, and that the ammonia is necessarily all lost in the effluent water; indeed, several of these processes have been known actually to increase the amount of ammonia in the effluent water, by decomposing some of the organic matters. The only precipitating process which had the merit of attempting to throw down the ammonia was the phosphate process, which has been tried and abandoned so many times in this and other countries; the reason of its failure was very simple: the ammonio-magnesian phosphate which it was expected would be found in the precipitate, requires an excess of ammonia in the solution to render it at all insoluble, so that if any of this salt were contained in the sediment it would merely show that the effluent water still contained an excess of ammonia.

We must comment especially upon two points in which a person seeking for information is likely to be misled as to matters of fact by consulting this book. On page 17 we observe a table of the average percentage composition of solid and fluid human excreta, from which one might easily be led to suppose that the solid is more valuable than the fluid (as it is *weight for weight*), but we nowhere

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